

GIS-based decision support system for groundwater conjunctive use planning under climate change

Nigel W.T. Quinn

Public Comments

No public comments were received for this proposal.

Collaboration Panel Review

Proposal Title

#0193: GIS-based decision support system for groundwater conjunctive use planning under climate change

Final Panel Rating
adequate

Collaboration Panel (Primary) Review

Collaboration:

Will the results of the collaborative effort be greater than the sum of its parts? Is it clear why the subprojects are part of a larger collaborative proposal rather than several independent smaller ones?

adequate

It is clear that the project depends on the interaction and work from several groups. To address the stated needs, these groups must work together to achieve the stated study goals. The objective will complete work that has already been established by the same groups. "Opportunities to collaborate" are stated as important in Phase 2 of the project.

Interdependence And Integration:

Does the proposal have an example that clearly articulates the conceptual model of each subproject and how they link together as a whole? Are the boundaries of the study plans focused and cohesive, yet well delineated? Is there a plan for potential differences in the stages of subproject completion times? Are there clear plans for analyses and interpretations which seek to identify and quantify relationships among the data collected in various subprojects rather than separate analyses for each subproject?

adequate

The proposal is described as two phases with distinct work from each subgroup feeding into a larger project. Plans for analyses and interpretations are not as clear.

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Collaboration Panel Review

Project Management:

Is it clear who will be performing management tasks and administration of the project? Are there resources set aside for project management and time given for investigators to collaborate? Is there a process for making decisions during the course of the project? Are there acknowledgments of potential barriers to collaboration and explanations of how team members will overcome barriers particular to their institutions?

adequate

There is a designated PM. Meeting times and funds are identified in the budget. A process for making decisions is assumed to be during meetings and over the course of the project. A workshop is planned. Demonstrations are also planned. No acknowledgements of potential barriers or resolutions are stated.

Team Composition:

Does the lead principal investigator have successful management history and experience leading collaborative teams? Is it clear that all key personnel are committed to making significant contributions to the project? Do team members have complementary skills?

adequate

The lead investigator's stated history in leading teams is indicated by title rather than by description. It is clear that all personnel are committed. (I infer that these groups have collaborated much in the past.) Skills are complementary among team members.

Communication Of Results:

Is there a clear plan for comprehensive and cohesive reporting of project progress to the CALFED community?

adequate

The proposal states that authorship of journal papers and reports and user demonstrations of the product at workshops are the methods of technology transfer.

Additional Comments:

Collaboration Panel (Discussion) Review

Primary reviewer judged that the integration component should be rated higher than adequate due to the conceptual model integration. She also felt that project management area is mixed in results, with some parts described better than others. Overall felt that this proposal is at the adequate level.

The secondary reviewer agreed with the Primary reviewer. Felt the budget was inadequate to support the tasks. Because the integration of phase 1 and phase 2 within the proposal was not well defined, the reviewer judged it adequate (in agreement with the primary).

Technical Synthesis Panel Review

Proposal Title

#0193: GIS-based decision support system for groundwater conjunctive use planning under climate change

Final Panel Rating
adequate

Technical Synthesis Panel (Primary) Review

TSP Primary Reviewer's Evaluation Summary And Rating:

Dr. Quinn has submitted an interesting proposal to develop a GIS-based decision support system to evaluate conjunctive use planning under climate change. The proposal has three main elements: (1) development of the GIS DSS system; (2) enhancements to the IGSM2 model to improve simulation of wetland drainage; and (3) climate change scenario development. The basic premise of the proposal is a good one -- visualisation tools are required to adequately understand the complex impacts of climate change. The main weakness of the proposal is in scenario development. The applicants state that they will rely on the work of other investigators (Miller, Dettinger, and so forth), and collaborate with them to obtain local climate scenarios. However, Miller and Dettinger are not included in the budget, and there are no letters of support demonstrating that they will participate. Collaboration does not occur magically, and the primary panel reviewer has serious concerns that these work elements will be completed. Pertinent comments from the external reviewers include: (1) The applicants could have improved their proposal by including more extensive references, justification of certain aspects of their work (particularly the relationship to climate modeling), and better figures. (2) A much needed project with outstanding CALFED stakeholder buy in and support.

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Additional Comments:

Dr. Quinn has submitted an interesting proposal to develop a GIS-based decision support system to evaluate conjunctive use planning under climate change. The proposal has three main elements: (1) development of the GIS DSS system; (2) enhancements to the IGSM2 model to improve simulation of wetland drainage; and (3) climate change scenario development. The basic premise of the proposal is a good one -- visualisation tools are required to adequately understand the complex impacts of climate change. The main weakness of the proposal is in scenario development. The applicants state that they will rely on the work of other investigators (Miller, Dettinger, and so forth), and collaborate with them to obtain local climate scenarios. However, Miller and Dettinger are not included in the budget, and there are no letters of support demonstrating that they will participate. Collaboration does not occur magically, and the primary panel reviewer has serious concerns that these work elements will be completed. Pertinent comments from the external reviewers include: (1) The applicants could have improved their proposal by including more extensive references, justification of certain aspects of their work (particularly the relationship to climate modeling), and better figures. (2) A much needed project with outstanding CALFED stakeholder buy in and support.

Technical Synthesis Panel (Discussion) Review

TSP Observations, Findings And Recommendations:

The technical reviewers and the panel agreed that this proposal addresses an important topic, and would be conducted by well qualified investigators. The technical reviewers and primary panelist reviewing this proposal commented on a lack of detail in several sections of the proposal, including the arguments supporting their claims that groundwater has been ignored in current models and the need for a better user interface. Consequently, the basic premise and need for the work were not well explained. There also was a concern regarding how extensive and effective collaboration would be

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Technical Synthesis Panel Review

during the proposed research, especially since the collaborators mentioned for scenario development were not included in the budget.

Technical Review #1

proposal title: GIS-based decision support system for groundwater conjunctive use planning under climate change

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	<p>The goals to enhance tools directed at assessing the vulnerability of water within San Joaquin River Basin with climate change and to provide guidance in management, the objectives (to enhance existing tools; to build a better understanding of the interdependencies between hydrological factors; and to enhance GIS-base DSS), and the hypotheses (missing components of existing models/tools) are clearly stated and internally consistent.</p> <p>The idea is timely and important to the water community in Bay-Delta region.</p>
Rating	very good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	<p>The study is justified relative to existing knowledge of groundwater conjunctive use and climate variability.</p> <p>The conceptual model is stated in the proposal and it explains the underlying (climatical and hydrological)</p>
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Technical Review #1

	basis for the proposed work. The selection of research project with the full-scale implementation is justified.
Rating	very good

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	The approach is well designed and appropriate for meeting the objectives of the project and is feasible. The results are likely to add to the base of knowledge. The project is likely to generate novel information, but not new methodology or approaches. The information will ultimately be useful to decision makers.
Rating	good

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success? Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The approach is documented and technically feasible. However, the justification or feasibility of the downscaling large scale data derived from General Circulation Models to San Joaquin River Basin should be explained fully. The likelihood of success is high.
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Technical Review #1

	The scale of the project is consistent with the objectives and within the grasp of authors.
Rating	good

Monitoring

If applicable, is monitoring appropriately designed (pre–post comparisons; treatment–control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	Monitoring is not proposed. There are plans to interpret monitoring/observation data for application of DSS and climate change scenario development (Task 3).
Rating	good

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	<p>Products of value (DSS, refined IGMS2, application, and papers/reports/manual) are very likely from the project.</p> <p>Contributions to larger data management systems are relevant and considered, but integration to these systems are not stated clearly although DSS interaction with databases is mentioned.</p> <p>Interpretive (or interpretable) outcomes from DSS and its application are very likely from the project.</p>
Rating	good

Technical Review #1

Additional Comments

Comments	Would be more impressive if the DSS is designed as a GIS-Web-base DSS so everybody can use it through internet.
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Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	<p>The track record of authors in terms of past performance (Quinn's publication 2, 4, and 9 and Dogrul's experience since 2001 on IGSM2) is excellence and impressive.</p> <p>The project team is qualified to efficiently and effectively implement the proposed project.</p> <p>They have available the infrastructure (mainly computers) and other aspects of support necessary to accomplish the project.</p>
Rating	very good

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The budget is reasonable and adequate for the work proposed. However, it is unclear the role of the associate engineer (no listed in the Tasks Form or Applicant Form) having budget in every task.
Rating	good

Overall

Provide a brief explanation of your summary rating.

Technical Review #1

Comments	<p>The proposal's strengths: (1) a well defined issue, groundwater conjunctive use under climate change, will be addressed; (2) a GIS-base DSS will be enhanced; and (3) applications to San Joaquin River Basin will be provided.</p> <p>The weaknesses are (1) no detailed and quantitative discussions on climate impacts on the groundwater in San Joaquin River Basin and (2) no a technical diagram and its explanation to show the logical or hydrological-climatical relationships between components of DSS.</p>
Rating	good

Technical Review #2

proposal title: GIS-based decision support system for groundwater conjunctive use planning under climate change

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	The goals of the project are clearly stated and timely with respect to the IGMS2 software that will have improved capabilities and utility. However because application of the software is currently limited to the Central Valley of California the goals may seem limited when viewed from an outside perspective.
Rating	very good

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full-scale implementation project justified?

Comments	The overall justification given for the project (increasing the utility and usage of the IGSM2 hydrologic software) is sound although the details are sketchy. Documentation within the proposal (particularly the very poor figure quality and paucity of references) do little to enhance the proposal's justification. The PIs propose to concentrate their work in the Merced district but offer no supporting justification for this locality. Places such as the "X-2" location in the estuary and the Delta Mendota Canal are mentioned as if everyone knows where these places are and why they are important. On the positive
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Technical Review #2

	side, increasing the usefulness of the groundwater/surface water model through better visualization and decision support software is clearly a proper and useful justification for the work.
Rating	good

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Comments	<p>One of the project's primary goals is using an atmospheric general circulation model (GCM) to understand the effects of climate change on the regional hydrology of the San Joaquin hydrologic system. While this is a laudable goal, specifics of the scientific approach are vague and those that are given are somewhat out of date. The primary reference to a GCM study of this part of the world (Lettenmaier and Gan, 1990, WRR) is almost 15 years old at this point. Modern GCMs still have notoriously poor spatial resolution and are not particularly appropriate for the types of problems being addressed in this proposal. Furthermore, there is only the vaguest of references to which GCM might be used (bottom of p. 7). Since 1990, regional climate models (RCMs), which use the same governing equations as GCMs as well as GCM output for boundary conditions of simulations at a much finer scale, have emerged as the tool of choice for the type of study the PIs propose. The PIs would do well to acquaint themselves with this literature and incorporate it into their work. Examples of recent RCM studies include Hong and Pan, Journal of Geophysical Research, v. 105, p. 29,625 and Chen et al., Journal of Geophysical Research, v. 108, p. 4348</p> <p>Specifics of the IGSM2 hydrologic code that will be improved and expanded are sparse. It would be helpful</p>
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Technical Review #2

	<p>if the PIs had referenced the comparison of this model to others that more commonly used and familiar to practicing hydrologists.</p> <p>The incorporation of GIS management and decision technologies into the models is a worthwhile approach given the widespread use and application of this technology in many areas of earth science.</p>
Rating	good

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success?
Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The project appears feasible within the context of the criticisms of the project's justification and approach. GIS methodologies and improved graphics and user capabilities are the wave of the future and incorporating them into existing IGMS2 software is well within the grasp of the PIs.
Rating	very good

Monitoring

If applicable, is monitoring appropriately designed (pre-post comparisons; treatment-control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	Little attention is paid in the proposal to monitoring the progress of the project. However, it would appear that not much monitoring is really required for the work that is proposed.
Rating	very good

Technical Review #2

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	The products generated by the project appear reasonable. The PIs mention a well-established user group for the software through through which products can be disseminated. Workshops to demonstrate the new capabilities of the work is a very good idea and will help leverage the investment in the project.
Rating	excellent

Additional Comments

Comments

Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The three PIs appear to be capable scientists who can complete the proposed work. They clearly have the experience, track record, and professional contacts to be successful.
Rating	excellent

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The budget seems reasonable for the work proposed and the number of investigators involved. The PIs have done a good job in documenting the expenses necessary for the project's success.
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Technical Review #2

Rating	very good
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Overall

Provide a brief explanation of your summary rating.

Comments	This is a solid proposal by PIs capable of doing important work in a timely and professional fashion. The budget is reasonable and in line with the products that are expected. The PIs would could have improved their proposal by including more extensive references, justification of certain aspects of their work (particularly the relationship to climate modeling), and better figures.
Rating	very good

Technical Review #3

proposal title: GIS–based decision support system for groundwater conjunctive use planning under climate change

Review Form

Goals

Are the goals, objectives and hypotheses clearly stated and internally consistent? Is the idea timely and important?

Comments	The project goals are clearly stated on page 4 and are internally consistent throughout the application. Groundwater interactions are very timely and important issues.
Rating	excellent

Justification

Is the study justified relative to existing knowledge? Is a conceptual model clearly stated in the proposal and does it explain the underlying basis for the proposed work? Is the selection of research, pilot or demonstration project, or a full–scale implementation project justified?

Comments	The application clearly justifies the project based on understanding and experience with existing knowledge/models. The project's conceptual model is clearly stated and linked to the proposed work.
Rating	excellent

Approach

Is the approach well designed and appropriate for meeting the objectives of the project? Is the approach feasible? Are results likely to add to the base of knowledge? Is the project likely to generate novel information, methodology, or approaches? Will the information ultimately be useful to decision makers?

Technical Review #3

Comments	The project's approach is extremely well designed to expand and enhance existing efforts to both expand the base of knowledge and generate new information. The approach specifically emphasizes delivering information/products that will be useful and easily accessible to decision makers.
Rating	excellent

Feasibility

Is the approach fully documented and technically feasible? What is the likelihood of success?
Is the scale of the project consistent with the objectives and within the grasp of authors?

Comments	The application clearly and fully documents the proposed work's technical feasibility. There is a very high likelihood of project success and it is within the authors' grasp.
Rating	excellent

Monitoring

If applicable, is monitoring appropriately designed (pre-post comparisons; treatment-control comparisons)? Are there plans to interpret monitoring data or otherwise develop information?

Comments	N/A
Rating	not applicable

Products

Are products of value likely from the project? Are contributions to larger data management systems relevant and considered? Are interpretive (or interpretable) outcomes likely from the project?

Comments	A clearly exceptional mix of products (completion reports, DSS documentation and user manual and peer reviewed journal submissions) and aggressive outreach to the user community through 2 hands on workshops and
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Technical Review #3

	the active participation in an existing model user's group.
Rating	excellent

Additional Comments

Comments	Authors should double check references (missing cite to Gleik 1989 pg. 2).
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Capabilities

What is the track record of authors in terms of past performance? Is the project team qualified to efficiently and effectively implement the proposed project? Do they have available the infrastructure and other aspects of support necessary to accomplish the project?

Comments	The application was submitted by an extremely well qualified, diverse team with considerable, longstanding work experience in the CALFED area.
Rating	excellent

Budget

Is the budget reasonable and adequate for the work proposed?

Comments	The budget was reasonable for the proposed work and reflects a high degree of leveraging between other interested and involved stakeholders.
Rating	excellent

Overall

Provide a brief explanation of your summary rating.

Comments	Outstanding team with exceptional experience. A much needed project with outstanding CALFED stakeholder buy in and support. I firmly believe that this project can
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Technical Review #3

	significantly improve management decision making and prioritization in the project area. I strongly support full funding for this project.
Rating	excellent